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**United States Patent** [19]

Winter et al.

[11] **Patent Number:** **6,014,247**[45] **Date of Patent:** **Jan. 11, 2000**[54] **ELECTRONIC INK DIMMING MIRROR**[75] Inventors: **Michael Winter**, New Haven, Conn.;  
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Southfield, Mich.[21] Appl. No.: **09/092,222**[22] Filed: **Jun. 5, 1998**[51] **Int. Cl.**<sup>7</sup> ..... **G02B 1/06**[52] **U.S. Cl.** ..... **359/296; 359/253; 359/604**[58] **Field of Search** ..... 359/296, 253,  
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407[56] **References Cited****U.S. PATENT DOCUMENTS**

3,341,274	9/1967	Marks	359/296
3,655,267	4/1972	Forlini	359/296
4,087,376	5/1978	Foris et al.	252/316
4,126,854	11/1978	Sheridon	359/296
4,919,521	4/1990	Tada et al.	359/296
5,409,734	4/1995	Lee et al.	427/163.1

5,463,492 10/1995 Check, III ..... 359/296

5,650,872 7/1997 Saxe et al. .... 359/296

5,691,849 11/1997 Ledroit et al. .... 350/603

5,838,482 11/1998 Decroupet et al. .... 359/253

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The present invention provides a self-dimming mirror for a vehicle. The mirror includes a layer of microspheres which contain microparticles and a dielectric liquid. The microparticles have an electrical charge and move between a dispersed state and a segregated state in response to the polarity of an electrical charge on an adjacent electrode. In a first embodiment, the microparticles are reflective and their reflectivity of an incidence light is determined by whether the microparticles are in the dispersed state or the segregated state. In a second embodiment, microparticles include a pigment layer and the transmissivity of an incidence light through the microsphere is determined by whether the microparticles are in a dispersed state or a segregated state. Thus, the present invention provides an electronic dimming mechanism for a mirror.

**15 Claims, 3 Drawing Sheets**